

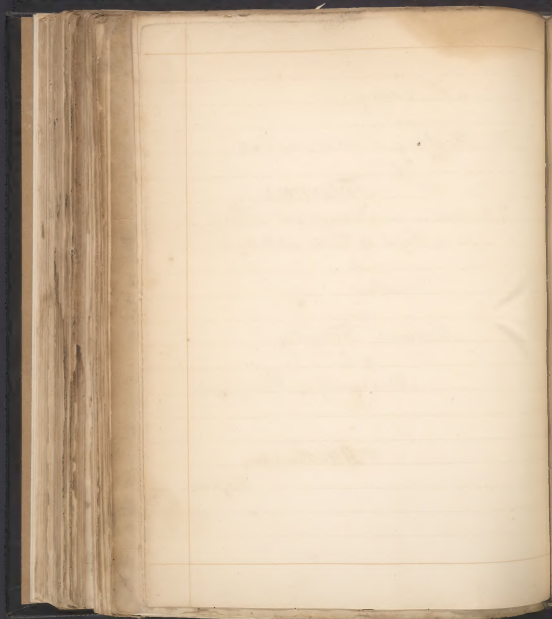
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Icterus

before Family

W. H. Worthington

admitted March 24th 1820

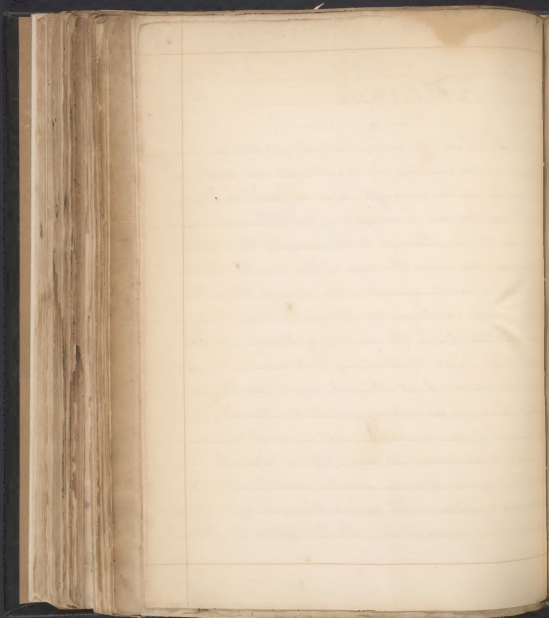


to 5  
An Essay  
on  
The History, Causes, and Cure  
of Tetanus.

Submitted as an Inaugural Thesis  
for the Degree of Doctor of Medicine

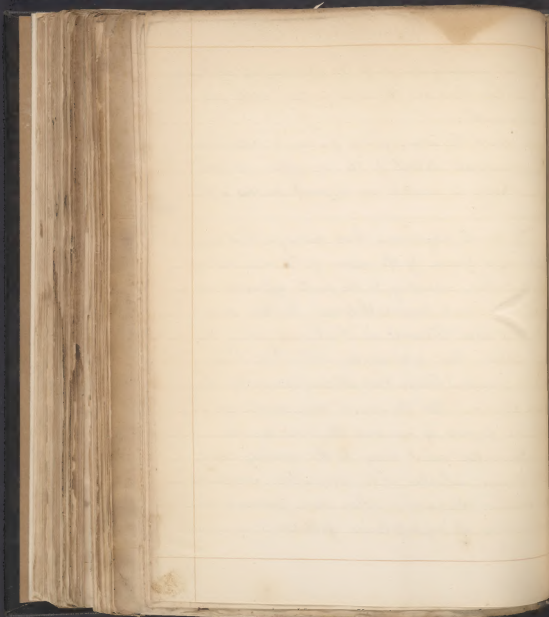
to the  
Trustees  
and  
Medical Faculty,  
of the  
University of Pennsylvania.

W. A. Worthington.  
Virginia



## Tetanus.

This disease, though of rare occurrence in our country, is nevertheless so common, so terrible in its progress, and so fatal in its issue, as to have become a subject of no little importance. It is one which, although it has occupied the attention of Physicians since the days of Hippocrates, obtains as great a variety of sentiment as any other subject in the whole catalogue of diseases; and taking into consideration the variety of success attendant upon different plans of treatment, this is not to be wondered at. Indeed, such are the imperfections of our nature; such the diversity or prejudice of our education; and in such different lights do we behold the same object, that it is hardly possible that we should exactly concur in any one opinion. To censure, therefore, or to condemn others because they think differently from

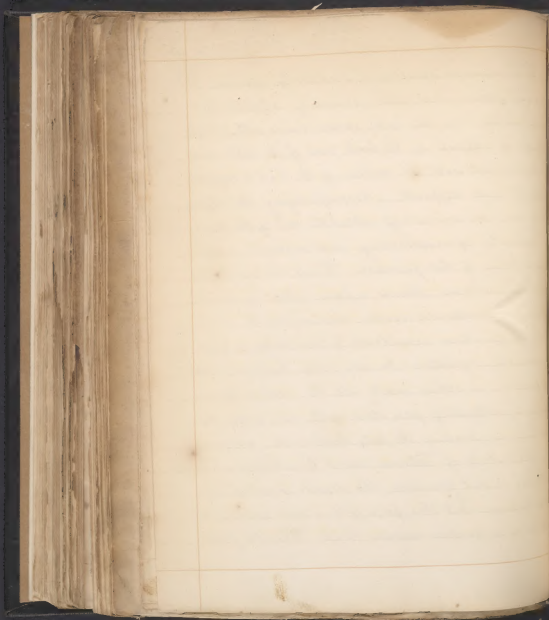


us, is as unreasonable as to be dissatisfied with them because they have not the same features and complexion with us.

It would be unnecessary for me to enter into a very minute detail of the symptoms, as little or no variety is related by different writers on the subject.

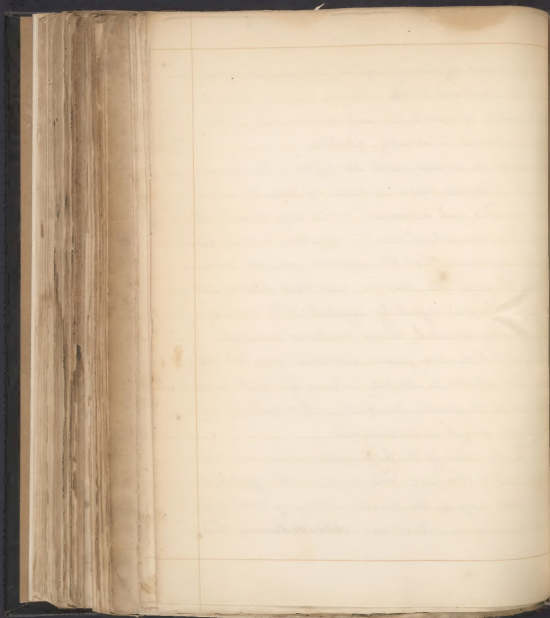
The Greek physicians have distinguished universal, rigid spasm, by the name of Tetanos; and subdivided this, according to the parts affected, into Opisthotonos and Emprosthotonos. Cullen once supposed that Tetanus, or Lock-jaw, was a distinct form; but afterwards, in his First Lines, agreed, (and I believe that all now concur in the same opinion) that the several terms mentioned are different degrees of one and the same disease.

No matter what may be the exciting cause of Tetanus; whether it be idiopathic, or dependant on another disease:—when once formed, the same series of symptoms follow.





The disease sometimes suddenly assumes a violent form; but more commonly approaches gradually:—in this case, commencing with a slight degree of stiffness in the back part of the neck, which is augmented until the motion of the head is rendered painful and difficult. Accompanying this stiffness there are, an uneasiness about the root of the tongue, a difficulty of swallowing, and at length an entire interruption of that function. While the rigidity of the neck continues, there is a pain, often very violent, about the scrobiculus cordis, shooting into the back; and this has been considered by some writers as a pathognomonic symptom. In some cases, the spasm extends no farther; in others, nearly all the muscles become affected, extending from those of the neck along the whole spine, bending the body backwards, and forming that state of Tetanus called *Opiethotonos*. When the body is bent forwards, the disease is called *Emprostotonos*; but this form of it is said never to exist except of a partial nervous kind. When the flexor

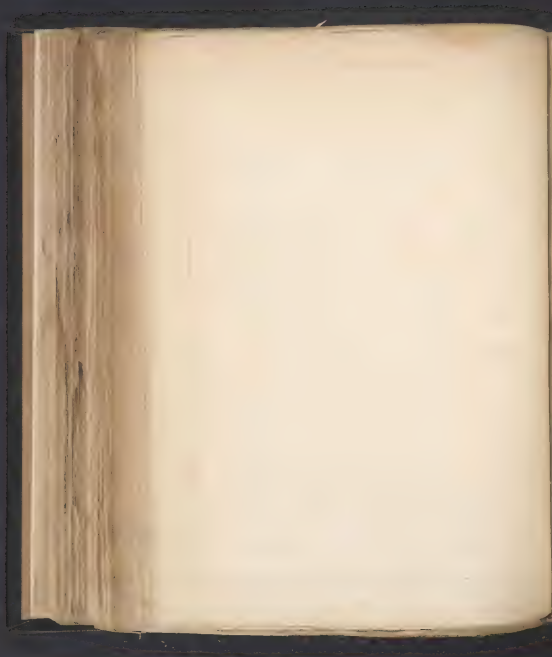


muscles become so strongly affected as to equal the extensors, to keep the head and trunk straight, rigidly extended, and incapable of motion in any direction, the Latin term *Tetanus* is strictly applied.

Some of the muscles resist the effects of the disease, for a considerable length of time; of these the muscles of the thoracic and abdominal viscera may be mentioned. That these are not primarily affected, is obvious from the circumstances, that the appetite remains unimpaired through the disease, and that whatever food may be taken is regularly digested. The urine also is generally secreted, though sometimes retained.

Constipation is a general attendant upon this disease; but whether to attribute it to an effect of the disease, or to the opiates commonly administered in it, is a point as yet undetermined.

The muscles of the fingers often retain some mobility until the last. The tongue is not affected at first; nor any of the muscles belonging to the organs of the five senses. It is very extraordinary that

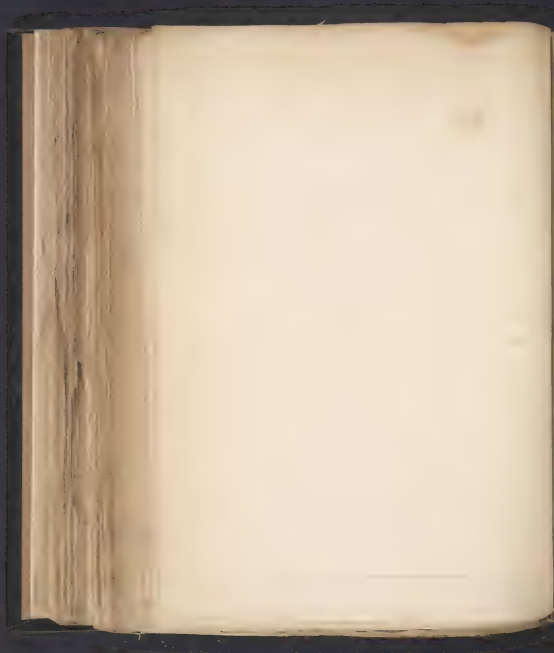


the head is seldom affected with delirium, or even confusion of thought, until a protracted period of the disease; when, by the repeated shocks of this violent affection, every function of the system is disordered.

The spasms are generally attended with pain; but violent pain is not a necessary attendant upon the general spasms. Noctely says, "I have known people in the Tetanus with sweat running off from them, owing to the agonizing pulling of the muscles, who have nevertheless told me, though they felt a distress which they could not describe, yet they could not say it was actual pain." I have myself seen a case, in which the patient complained very little of pain.

The greatest violence of spasm is not permanent, but admits some remission to the contraction of the muscles; though not sufficient to allow the action of their antagonists.

When the spasms are frequent and violent the



pulse is hurried, contracted, and irregular: the respiration is also affected. During the remission, the pulse and respiration return to their natural condition.

This appears to be the state of the pulse in tropical climates, when tetanus is most prevalent. The disease in those climes is insinuated in the muscles, and the arteries are much below the common standard of excitement. But in our climate we find an excited pulse is a very general concomitant of Tetanus: The blood drawn in these cases is coated with coagulable lymph.

Such are the symptoms of Tetanus, as derived from different authors, together with my own experience, which must necessarily have been limited.

The susceptibility to this complaint, whether idiopathic or symptomatic, does not depend on age or sex; neither is it confined to the human species. I have seen it produced by castration in a lamb. The most common causes are, cold and moisture applied to the body when under profuse perspiration,

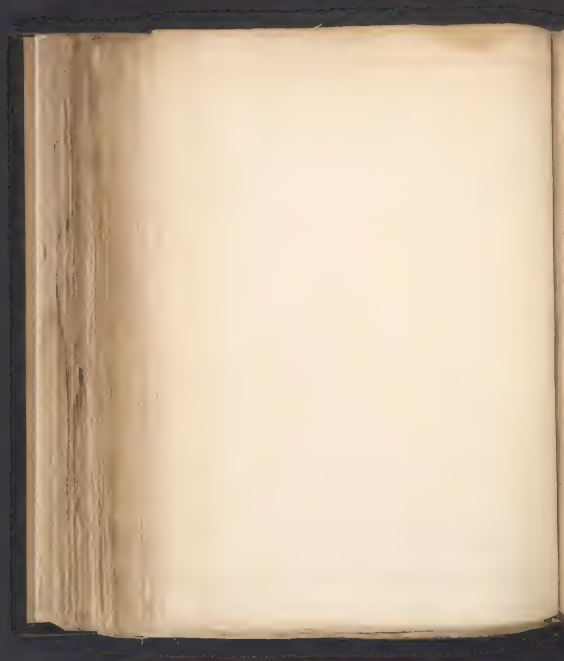




very hot weather; irritation in the alimentary canal, as worms, constipation, or the retention of meconium in children; punctures, lacerations, and other injuries of the nerves or tendons; gun shot wounds, and various surgical operations, particularly in warm climates. To these, perhaps, we may add nervous sympathy. It is extremely difficult to account in a rational and satisfactory manner, for the production of this disease from such slight causes as those from which it sometimes appears to proceed: But in those cases the sympathy of the nerves assists us. This is a very common and convenient idea by which to account, or to amuse us in endeavouring to account, for various changes that occur in the human system. It appears to be a law of the animal economy, that irritating causes applied to one part excite sensation or motion in others. Pain, or a sense of itching in the ureans penis gives the signal of the excess of that peculiar acid in the secretion from the kidneys which lays the foundation of calculi. This is a fact, and an important one; as we are induced

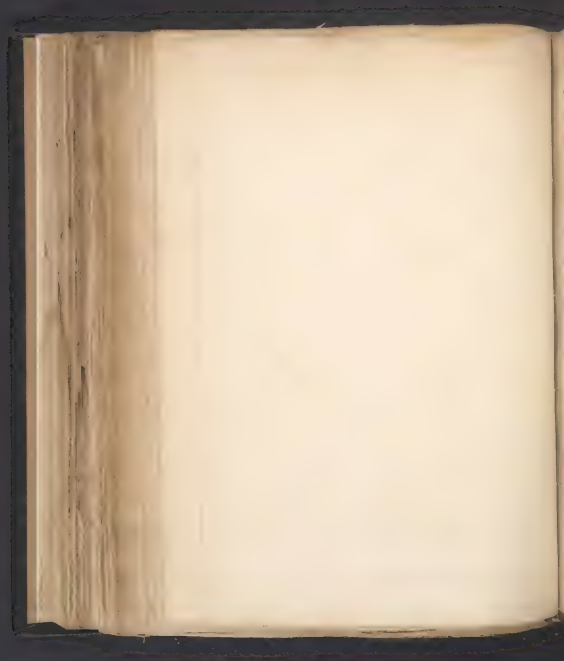


by it to adapt the use of such means, of medicine and diet, as will prevent the accumulation of the acid. But why an irritating cause applied to the kidneys, should affect the sensorium, and the sensation be referred to the glans penis, is a question not easily solved. Why irritation of a stump after the amputation of a limb, produces a sensation of pain referred to the toe, is equally difficult to account for: or why intense pain should be felt in the soles of the feet, on seeing a man walking on the roof of a house, I shall not intrude on your patience by theorizing upon, because I despair of producing any thing more satisfactory, than what may be seen in books. I shall therefore only add with Professor Wore, "that sympathy is entirely inexplicable, and, like gravitation is known only by its laws." It is sufficient for us, to be acquainted with the facts with regard to the sympathies of the different parts of the system, which may be useful in establishing the diagnosis of diseases, though we shall not be able to account for them with facility. &c.



In reviewing the long vista of time which has elapsed since this disease has been a matter of consideration among the ablest writers who have graced the annals of medical science, and recollecting the diffidence with which all have entered upon its pathology, and the positive refusal of others to enter at all; it is unreasonable to suppose that we should have the presumption to attempt that, which the ingenuity of those illustrious men was unable to elucidate. Nor, indeed, is it our intention to do more than merely notice what has been previously advanced on the subject by others, and the practical deduction which may thence be drawn.

The cause of Tetanus has been sought for in the spinal marrow. The opinion that this is the original seat of the disease, has been predicated on the circumstance of extravasated serum having been found in the spinal canal. But these appearances I would rather attribute to the effects, than to the causes of the disease; upon the following grounds: First, how it may be an effect: We know that a state of tension of the



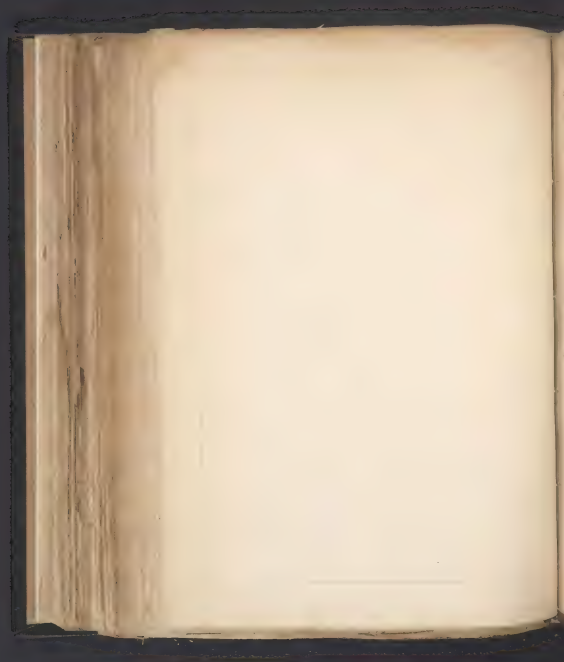
muscles accelerates the motion of the blood in the parts. In the common operation of phlebotomy, this fact may be demonstrated by alternately contracting and relaxing the muscles of the arm from which the blood issues. Secondly: we cannot conceive that such an extravasation could act in any other manner than by mere compression. Now we know that compression of the brain produces a more general relaxation of the whole muscular system than an increased action of any other part. And the compression of a nerve, instead of producing a contraction of the muscles upon which it is distributed, deprives them of the power of contracting.

With respect to the treatment of Tetanus, as many opinions have prevailed as upon the subject of its pathology. The first class of remedies in point of time, appears to have been antispasmodics. Among these Opium held a distinguished place. If the disease depended originally upon mere nervous irritation, much benefit might be





reasonably expected from this medicine: but it would appear, that a derangement of the digestive system sometimes produces the symptoms of Tetanus, which are only to be removed by means of cathartics, without which costiveness prevails to a great degree. We should as soon expect to relieve a patient of an itching at the anus caused by worms, by an application of a poultice to the part, as to relieve a case of Tetanus, dependant upon the above mentioned causes, by means of Opium. The propriety, therefore, of this remedy in Tetanus, must be determined by the cause of the disease. If it is likely to do good in any cases, we think it would be in those which arise from wounds. Opium is an article calculated to do much good, or much mischief. That it has displayed both of these properties in the present disease, we have no doubt: indeed Tetanus has been produced by the exhibition of a large dose of it. Salivation by Mercury has been tried; but we believe with little success. Indeed the very



circumstance of a want of time in this disease is sufficient to preclude the use of that remedy, even if it would be effectual when obtained. Tetanus has been known to occur while the patient was under salivation.

In those cases which arise from intestinal irritation, the cathartics are plainly indicated. We suppose that their action would not terminate by removing the cause of irritation; but we think something might also be expected from their relaxing power on the system. — This opinion is not sanctioned by all: it is, however, generally agreed that purging is the only remedy to be relied on in Trismus Nascentium; and if we recollect the benefit derived by Dr. Physick in affections of the spinal marrow, we would not hesitate, at least, to try the experiment of active and continued purging. — The same arguments will apply to the use of emetics. Their efficacy in many diseases, in which their effect must be attributed to the general shock (if we may be allowed the expression) which they give to the system, induces us



to believe, that they would be eminently serviceable in Tetanus, when judiciously exhibited. Probably their action should not be extended beyond the production of nausea:— indeed we should apprehend serious consequences from the operation of an active emetic when the mouth is closed.

Cold bathing has been much extolled for its power in arresting tetanic action. As a palliative it undoubtedly stands unrivalled: but as many cases have occurred, in which the spasms have returned after having been suspended by the bath; and in some instances with an augmented violence; so much confidence ought not to be placed in this remedy, as would tend to the exclusion of others. However, as we cannot believe that in those cases in which the spasms return with greater violence after their suspension by the effusion of cold water, the bathing was really the cause of the aggravation, we would not hesitate to plunge the patient into cold water; for, if its salutary effects were



not permanent, they would at least afford us an opportunity of applying other remedies with a better prospect of success.

The hydrocyanic acid, from its good effects upon the muscular and nervous system, appears calculated to be useful in this disease. Although no opportunity has occurred to us of witnessing or reading of its effects in Tetanus; yet we presume much benefit might result from that article. From all that we have read upon the subject of Tetanus, we must draw the conclusion, that it is one of the most refractory of diseases, and one which offers to the Physician but slight hopes for the successful application of his art.

From our present view upon this subject, if a case of Tetanus came under our care, we would adopt the following practice.

The cold bath should first claim our attention. If the spasm should be removed, we would immediately administer a brisk cathartic, aided if





suppuration by emolenta. If however the first immersion of the patient should not be effectual in producing an entire relaxation, it should be repeated after the interval of two or three hours. The propriety of a repetition, we would determine by the circumstances consequent to the first. If the skin became warm, or if febrile symptoms appeared we would repeat the application of water either cold or warm. If, on the contrary, the external surface of the body should not be affected in this manner, and the bathing seems not to produce any durable effect, we should abstain from its further use.

During the intervals obtained by means of the bath, we would exhibit opium joined with other anodynes, and apply blisters and other stimulating applications to the skin. Tinctured steams, or vapours stand highly commended by the late Dr. Boerhaave, and the enlightened L. physicians of Holland. Dr. Boerhaave whose observations of ulceration in the disease have



been ample, as he practiced in a tropical climate, snakes in exalted terms of blisters; and says we never knew a case terminate fatally when they even produced redness of the skin. If so, would not the spirits of turpentine and cantharides, or even the real country, be eminently serviceable? Caustic issues have been highly recommended by Dr. Hartshorne of this city. As effusions have been discovered to take place in the vertebral canal, the spine should be the location of blisters.

Conjunctively with these remedies, we would also attempt a salivation. In all cases of plethoric patients, V.S. should be employed as the pulse should indicate. Dr. Rush says, "Perhaps bleeding ad deliquium animi, might so far relax the muscles, as to enable the blood-vessels, and other parts of the body, to abstract from them their agreeable and natural portions of excitement." We do not see the force of this reasoning. To bleed in Tetanus ad deliquium animi appears to us to be a dangerous

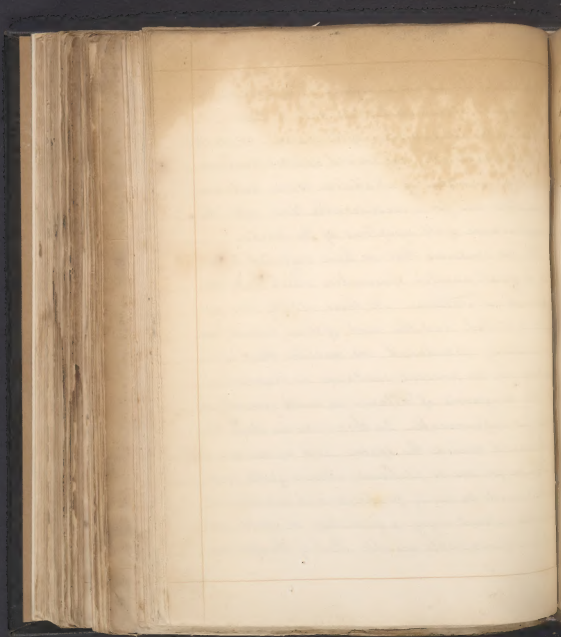


experiment. In all cases arising from wounds, digestive applications should be made to them.

During the intermission of the spasms, or at all times if practicable, we would exhibit cinchona, with large quantities of Madeira wine, and continue their use for a considerable time after the disappearance of all symptoms of the disease.

We are conscious that we have neglected to mention a great number of remedies which have been proposed in Tetanus. As their utility has not been established, and the most of them indeed have been entirely abandoned, we consider their introduction in the present instance as impertinent.

The prognosis of Tetanus we would generally consider as unfavourable. In those cases in which the bath would remove the spasm, and no recurrence of it ensue for one or two hours; where a gentle perspiration could be easily produced and maintained, and the patient enjoy a quiet sleep, we would anticipate a favourable result. But if the spasms



continue unaffected by any of the remedies which we  
have mentioned, and the skin remains cold, without  
perspiration; or if the sweat should be cold, we would  
expect a fatal termination on the third or fourth day,  
-perhaps sooner. ~

